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SOIL MECHANICS
and FOUNDATION
ENGINEERS Inc.

Palo Alto
June 3, 1966
Project 1939

Santa Clara County Flood Control and Water District
70 West Hedding Street
San Jose, California 95110

Attention: Mr. George Korbay

Subject: Exploratory Drilling for
Canoas Creek Project

Gentlemen:

Transmitted herewith are the logs of 14 exploratory borings made along the alignment of the Canoas Creek channel. Also attached are the results of laboratory visual classifications of selected soil samples from the borings. The holes were drilled on May 31, 1966, utilizing a truck-mounted Highway auger and the auger cuttings were sampled and logged by our geologist, Mr. Douglas Hamilton. Mr. Jeremy Wire of your staff was present during the drilling and specified the locations of the borings in the field. The auger cuttings were sampled so as to obtain representative portions of all soil strata encountered in the borings. The samples selected for laboratory classification included all those taken from depths at or below 10 feet and the next shallower samples in the case of those holes where no sample was obtained at about 10 feet.

The majority of the soils found at depths corresponding to the proposed channel invert (10 to 15 feet in depth) are fine grained, predominantly silty or sandy clays of moderate to high plasticity, and relatively impermeable. Granular, relatively pervious soils were found at channel depth only in hole no. 3. Between depths of 15 and 20 feet, pervious soils were encountered in hole numbers 6, 8, 13 and 14.

The results of the field logging and the laboratory classifications present the same general differentiation between fine-grained and granular soils. It should be noted, however, that there is a systematic variation in the detailed soil descriptions between the field and the laboratory. This results from a consistent tendency, when logging only from disturbed cuttings at natural moisture content, to overestimate the amounts of granular constituents in the soil and to underestimate the degree of plasticity of the clay fraction. Consequently, the field descriptions of clayey sand (SC) or clayey silt (ML-CL) usually correspond to the laboratory classifications sandy clay (CL) or silty clay (CL-ML), and soils which appeared in the field to be clay or silty clay of moderate plasticity (CL or CL-ML) often were found in the laboratory to be clay of relatively high plasticity (CH or CL-CH).

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Water was encountered at depths of 8 to 17 feet in hole numbers 11, 12, 13 and 14. It is probable that shallower depths to water exist in these areas during the winter season. It is also likely that water would have been found in some of the other holes, such as numbers 6, 7, and 8, had they been drilled earlier in the year.

It was noted, particularly in hole numbers 11 and 12, that water entered the holes quite rapidly despite the fact that the soils at water depth were clays of relatively low permeability. This feature probably is explained by the presence of either fine porous structure or interconnected microfissures in the soil. The resulting limited transmissibility of the clays probably will be destroyed almost entirely if the soils are disturbed and compacted during channel construction. In the absence of natural ground water, it could not be ascertained whether similar "pervious" clays are present along other sections of the proposed channel. Such a determination could be made by the performance of a series of infiltration tests similar to those used for the design of septic tank leaching fields or seepage pits.

It has been a pleasure to work with you on this project. If we may be of further service or if you have any questions concerning the results of this investigation, please contact us at your convenience.

Very truly yours,

SOIL MECHANICS and
FOUNDATION ENGINEERS, Inc.

Robert O. Dobbs
Chief Geologist

ROD:pw
Encls.(6)

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO. 1939 DATE 5/31/66
HOLE NO. 2 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - -
HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Clayey SILT	Gy	Dry	Friable	ML-CL						
Gravelly SAND, grading down to medium grained SAND	Dk Gy	Damp	Med Dense	SW	2 4 6	X				
Silty CLAY	Yel Gy-Brn	Damp to Moist	Stiff	CL-ML	8 10	X				
Slightly sandy silty CLAY	Gy	Moist	Firm to Stiff	CL-ML	12 14 16	X				
Clayey silty SAND to sandy clayey SILT, with scattered granules	Gy-Brn	Damp	Dense	SC to ML	18 20	X				
HOLE BOTTOM = 21'					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 2
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO. 1939 DATE 5-31-66

HOLE NO. 1 HOLE DIAMETER 12" DRILL RIG J. W. HIGHWAY AUGER SAMPLER - - -

HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Silty gravelly CLAY	Lt Brn Blk	Dry Damp	Friable; Hard Stiff	CL-ML	2	X				
Grades to					4					
Clayey GRAVEL	Gy-Blk	Damp	Dense	GC	6	X				
Pebbly slightly sandy SILT (slopewash soil derived from weathered serpentine and sandstone)	Grn-Gy	Sl Damp	Dense	ML	8 10 12	X X				
Sandstone bedrock, weathered silty SANDSTONE; cannot be drilled by auger. BOTTOM OF HOLE = 12½'	Gy-Brn	Sl Damp	Hard	Bed-rock	14					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 1
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO 1939 DATE 5/31/66

HOLE NO. 3 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - -

HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/ FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Sandy SILT to silty fine-grained SAND	Brn	Sl Damp	Med Dense	ML-SM	2 4 6	X				
Gravelly silty SAND grading to clean SAND	Dk Gy Brn	Damp	Med Dense	SM-SW	8 10	X				
Clayey silty fine-grained SAND	Gy-Brn	Damp	Dense	SC	12 14	X				
CLAY, plastic, with traces of organic matter	Gy	Damp	Stiff	CL-CH	16	X				
Silty CLAY, medium plasticity with some very fine-grained SAND	Gy & Brn	Damp	Firm to Stiff	CL	18 20	X				
BOTTOM OF HOLE = 21½'					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 3
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO. 1939 DATE 5/31/66
HOLE NO. 4 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/ FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
See note below.					2					
Clayey slightly sandy SILT with caliche	Dk Gy, Mottled Wht	Sl Damp	Med Dense	ML	4 6	X				
CLAY, plastic, with traces of organic matter	Dk Gy	Damp	Stiff	CL-CH	8 10	X				
Silty slightly sandy CLAY	Brn	Damp	Stiff to V Stiff	CL-ML	12 14	X				
Clayey sandy SILT to silty SAND	Lt Brn	Damp	Dense	ML-SM	16 18	X				
Sandy silty CLAY	Gy-Brn	Damp	Stiff	CL-ML	20					
BOTTOM OF HOLE = 21½' Note: Depth measured from top of bank - hole collared at -3' depth, on side of bank					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 4
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO. 1939 DATE 5/31/66
HOLE NO. 5 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/ FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Clayey SILT	Lt Gy-Tan	Dry	Friable	ML	2					
Clayey slightly sandy SILT	Mottled Tan & Gy	Sl Damp	Dense	ML-CL	4 6	X				
CLAY, plastic, traces of organic matter	Dk Gy	Damp	Stiff	CL-CH	8 10 12	X				
Silty CLAY intermixed with caliche	Gy-Wht	Damp	Stiff	CL-ML	14	X				
Silty fine-grained SAND grading to sandy clayey SILT	Tan	Damp	Dense	SM-ML to ML	16 18 20	X				
BOTTOM OF HOLE = 21'					22	X				

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 5
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO 1939 DATE 5/31/66

HOLE NO. 6 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -

HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Clayey SILT to silty CLAY	Gy	Dry	Friable	ML-CL						
Silty CLAY with pronounced sheared texture	Mottled	Damp	Stiff	CL-ML	2 4	X				
SILT to silty fine-grained SAND	Lt Gy	Sl Damp	Med Dense	ML-SM	6 8	X				
CLAY, plastic	Dk Gy	Damp	Stiff	CL-CH	10 12	X				
Sandy clayey SILT	Yel-Brn	Damp	Dense	ML-SM	14					
Clayey silty sandy GRAVEL	Mottled Yel-Brn	Moist	Dense	GC	16	X				
Rock cannot be drilled by auger (Bedrock or a large boulder). BOTTOM OF HOLE = 17'			Hard	Rock	18					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1839
HOLE NO. 6
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO 1939 DATE 5/31/66
HOLE NO. 7 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/ FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
See Note below.										
Silty CLAY	Dk Brn	Damp	Firm	CL-ML	2 4	X				
Clayey SILT to silty CLAY	Mottled Gy & Lt Brn	Damp	Stiff	ML-CL to CL-ML	6 8 10 12 14	X				
Grades to Silty CLAY to clayey silty very fine grained SAND; moderate plasticity	Gy-Brn	Moist	Stiff & Dense	CL-ML to SC	16 18 20	X				
BOTTOM OF HOLE = 21' Note: Depth measured from top of bank - hole collared at -1½' on side of bank.					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 7
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO 1939 DATE 5/31/66
HOLE NO. 8 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/ FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Silty CLAY	Dk Brn	Dry	Friable	CL-ML						
					2					
	Brn	Damp	Firm to Stiff							
					4					
						X				
Clayey slightly sandy SILT	Mottled Lt Gy & Brn	Sl Damp	Stiff & Med Dense	ML-CL	6					
					8					
					10					
Grades more sandy				ML-CL to SC	12					
						X				
					14					
					16					
					18					
Sandy GRAVEL	Gy	Moist	Dense	GW		X				
(No seepage noted)					20					
BOTTOM OF HOLE = 20½'					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 8
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO 1939 DATE 5/31/66
HOLE NO. 9 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/ FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
CLAY, plastic, expansive (dessication cracks on surface)	Dk Gy-Blk	Damp	Firm	CL-CH						
					2	X				
					4	X				
Silty CLAY	Lt Gy	Damp	Firm	CL-ML						
					6					
	Mottled				8					
	Mottled Gy & Or-Brn	Damp	Firm to Stiff		10	X				
					12					
					14					
					16					
					18					
Scattered granules	Gy-Brn	Damp to Moist			20	X				
BOTTOM OF HOLE = 21'					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 9
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO 1939 DATE 5/31/66
HOLE NO. 10 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL - - QUANTITY - - - LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/ FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Silty CLAY, expansive (large dessication cracks on surface)	Gy Brn	Dry to Sl Damp	Friable-Chunky	CL-CH to CL-ML	2					
					4					
						X				
					6					
					8					
Clayey SILT	Mottled Lt Brn & Gy	Sl Damp	Friable	ML-CL		X				
					10					
					12					
Silty slightly sandy CLAY, moderate plasticity	Mottled Dk Gy & Rust Brn	Damp	Stiff	CL-ML	14					
						X				
					16					
					18					
					20					
BOTTOM OF HOLE = 20½'					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 10
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO. 1939 DATE 5/31/66
HOLE NO. 11 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL 14' QUANTITY SEEPAGE LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
CLAY, high plasticity	Blk	Sl Damp	Stiff - Chunky	CL-CH	2					
					4	X				
Silty CLAY; medium plasticity	Mottled Lt Gy & Brn	Damp	Stiff	CL-ML	6					
					8	X				
					10					
Clay becoming more plastic	Lt Gy	Moist	Firm		12					
Free water at 14' (water rose to 12' after 5 minutes, then hole was backfilled. Rise may be due to hole caving)	Gy	Wet	Firm & Sticky		14					
					16					
					18					
					20	X				
BOTTOM OF HOLE = 21½'					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 11
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO 1939 DATE 5/31/66
HOLE NO. 12 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL 8' QUANTITY SEEPAGE LOGGED BY DHH

SOIL DESCRIPTION								SAMPLES		
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.	SOIL TYPE	DEPTH	JARS	SACKS	SPLIT SPOON	SHELBY	BLOWS/ FT.
CLAY, with caliche	Lt Gy	Dry	Loose	CL-CH						
CLAY, high plasticity	Blk	Sl Damp	Stiff, Chunky		2					
					4	X				
Silty slightly sandy CLAY to clayey sandy SILT	Mottled Gy to Or-Brn	Damp to Moist	Firm to Stiff	CL-ML	6	X				
Silty fine sandy CLAY, grading down to clayey silty very fine grained SAND Water at 8'	Gy	Wet	Firm -	CL-ML to SC	8					
					10					
					12					
					14					
					16					
					18					
					20	X				
BOTTOM OF HOLE = 20½'					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO. 12
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO. 1939 DATE 5/31/66

HOLE NO. 13 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -

HOLE ELEV. - - GROUNDWATER: LEVEL 15½' QUANTITY SEEPAGE LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Clayey SILT, loose, friable	Gy	Sl Damp	Friable	ML-CL						
					2					
					4	X				
					6					
					8					
Grades to Slightly sandy clayey SILT	Mottled Gy & Or-Brn	Damp	Firm		10	X				
					12					
			Sl Sticky		14					
Free water at 15½' Silty fine grained SAND	Gy-Brn	Wet	Med Dense	SM	16	X				
					18					
Grades to Silty to well graded fine grained SAND	Gy-Brn	Wet	Caving	SM-SW	20	X				
					22					
BOTTOM OF HOLE = 21'										

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SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1839
HOLE NO. 13
SHEET 1 OF 1

EXPLORATION DRILL HOLE LOG

PROJECT NAME CANOAS CREEK PROJECT NO 1939 DATE 5/31/66
HOLE NO. 14 HOLE DIAMETER 12" DRILL RIG J.W. HIGHWAY AUGER SAMPLER - - -
HOLE ELEV. - - GROUNDWATER: LEVEL 17' QUANTITY SEEPAGE LOGGED BY DHH

SOIL DESCRIPTION				SOIL TYPE	DEPTH	JARS	SACKS	SAMPLES		BLOWS/FT.
DESCRIPTION AND REMARKS	COLOR	MOISTURE	CONSIST.					SPLIT SPOON	SHELBY	
Silty CLAY	Blk	Sl Damp	Friable, Chunky	CL-ML						
					2	X				
					4					
Clayey SILT	Lt Gy-Brn	Sl Damp	Friable	ML-CL		X				
					6					
					8					
Grades to Clayey SILT to silty CLAY	Lt Brn	Moist	Firm - Sl Sticky	ML-CL to CL-ML	10					
					12					
					14					
Grades to Clayey SILT	Lt Brn	Moist	Firm	ML-CL		X				
					16					
Silt to clayey fine grained SAND	Lt Brn	Wet	Firm & Med Dense	SM-SC	18					
						X				
					20					
BOTTOM OF HOLE = 20½'					22					

500c

SOIL MECHANICS and FOUNDATION ENGINEERS, Inc.

PROJECT NO. 1939
HOLE NO 14
SHEET 1 OF 1

Project 1939

SOIL SAMPLE VISUAL CLASSIFICATION

Soil Mechanics & Foundation Engineers Inc.

IDENTIFICATION			ESTIMATED GRADATION				ESTIMATED ATTERBERG LIMITS		SOIL DESCRIPTION AND CLASSIFICATION
SAMPLE NUMBER	DEPTH	SOIL SYMBOL	MAXIMUM SIZE — MM	GRAVEL (Plus #4)	SAND (#4 to #200)	SILT & CLAY (minus #200)	LIQUID LIMIT	PLASTICITY INDEX	1 Descriptive Classification 2 Particle Size, Shape, and Gradation (Uniformiy, well, poorly graded) 3 Consistency, Elasticity, Toughness at Plastic Limit, etc. 4 Reaction to Shaking Test, Dry Strength, etc. 5 Color, wet state 6 Natural Structure, mineral content 7 Natural Moisture Content (Est. in percent)
1	8 ft.	CL-CH	0.1	0	10	90	50	25	CLAY, silty. Moderately tough at plastic limit. High dry strength. Light gray. Natural water content estimated at 20%. Very low permeability, K less than 10^{-9} cm/sec. No reaction to shaking.
1	12 ft.	CL	1.0	0	40	60	30	10	CLAY, silty and sandy. Low dry strength. Weak at plastic limit. Light gray. Natural water content about 15%. Low permeability.
2	8 ft.	CH	0.1	0	0	100	60	40	CLAY, silty. Moderately tough at plastic limit. High dry strength Gray. Natural water content at 30%. Very low permeability less than 10^{-10} cm/sec. No reaction to shaking.
2	13 ft.	CH	5.0 (#4)	0	10	90	60	40	CLAY, Same as above except containing some fine gravel or coarse sand.
2	19 ft.	CL	5.0 (#4)	0	30	70	30	15	CLAY, sandy and silty. Medium toughness at plastic limit. Light brown to gray. Estimated natural water content 20-22%. Low permeability. Less than 10^{-8} cm/sec. Slow reaction to shaking. Medium dry strength.
3	7 ft.	SM	10	5	65	30			SAND, silty. Non-plastic, poorly graded. Dark brown. Estimated natural water content at 12-15%. Quick reaction to shaking test. Estimated permeability 10^{-4} cm/sec.
3	12 ft.	MH-ML	0.5	0	30	70	50	10	SILT, clayey and slightly sandy. Brown. Estimated natural water content at 25%. Slight toughness at plastic limit. Slow reaction to shaking test. Low dry strength. Permeability estimated at 10^{-7} - 10^{-8} cm/sec.

SOIL SAMPLE VISUAL CLASSIFICATION

Soil Mechanics & Foundation Engineers Inc.

IDENTIFICATION			ESTIMATED GRADATION				ESTIMATED ATTERBERG LIMITS		SOIL DESCRIPTION AND CLASSIFICATION
SAMPLE NUMBER	DEPTH	SOIL SYMBOL	MAXIMUM SIZE – MM	GRAVEL (plus #4)	SAND (#4 to #200)	SILT & CLAY (minus #200)	LIQUID LIMIT	PLASTICITY INDEX	1. Descriptive Classification 2. Particle Size, Shape, and Gradation (Uniformiy, well, poorly graded) 3. Consistency, Elasticity, Toughness at Plastic Limit etc. 4 Reaction to Shaking Test, Dry Strength, etc. 5 Color, wet state 6 Natural Structure, mineral content 7. Natural Moisture Content (Est in percent)
3	16 ft.	CH	0.1	0	0	100	80	50	CLAY, silty. Tough at plastic limit. Very slow reaction to shaking test. High dry strength. Very low permeability less than 10^{-12} cm/sec. Dark gray. Estimated natural water content at 50%.
3	19 ft.	MH	0.1	0	0	100	60	20	SILT, clayey. Medium toughness. Slow reaction to shaking test. Medium dry strength. Dark gray. Estimated natural water content at 40%. Permeability low. K less than 10^{-10} cm/sec.
4	7 ft.	CH	0.1	0	0	100	80	50	CLAY, silty. High toughness. No reaction to shaking test. High dry strength. Dark gray. Estimated natural water content at 35%. Very low permeability. Less than 10^{-12} cm/sec.
4	13 ft.	CL	0.5	0	25	75	40	20	CLAY, silty and sandy. Medium toughness. Slow dilatancy. Medium dry strength. Light brown. Estimated natural water content 25%. Estimated permeability 10^{-9} - 10^{-10} cm/sec.
4	16 ft.	CL	0.5	0	30	70	35	20	CLAY, silty and sandy. Medium toughness. Slow dilatancy. Slight dry strength. Light brown to tan. Estimated natural water content 20%. Estimated permeability 10^{-7} - 10^{-8} cm/sec.
5	8 ft.	CL-CH	0.1	0	5	95	50	30	CLAY, silty. High toughness. Very slow reaction to shaking test. High dry strength. Dark gray. Estimated natural water content 35%. Estimated permeability less than 10^{-11}cm/sec.
5	13 ft.	CL-CH	.10	0	5	95	50	30	CLAY, silty. Medium toughness. No dilatancy. Medium dry strength. Dark gray. Estimated natural water content 35%. Estimated permeability less than 10^{-11}cm/sec.

SOIL SAMPLE VISUAL CLASSIFICATION

Soil Mechanics & Foundation Engineers Inc.

IDENTIFICATION			ESTIMATED GRADATION				ESTIMATED ATTERBERG LIMITS		SOIL DESCRIPTION AND CLASSIFICATION
SAMPLE NUMBER	DEPTH	SOIL SYMBOL	MAXIMUM SIZE — MM	GRAVEL (plus #4)	SAND (#4 to #200)	SILT & CLAY (minus #200)	LIQUID LIMIT	PLASTICITY INDEX	1. Descriptive Classification 2. Particle Size, Shape, and Gradation (Uniformly, well, poorly graded) 3. Consistency, Elasticity, Toughness at Plastic Limit, etc. 4. Reaction to Shaking Test, Dry Strength, etc. 5. Color, wet state 6. Natural Structure, mineral content 7. Natural Moisture Content (Est. in percent)
5	16 ft.	CL	5.0	5	40	55	30	15	CLAY, silty and sandy. Slight toughness. Slow dilatancy. Medium dry strength. Light tan. Estimated natural water content 15-18%. Estimated permeability 10^{-6} - 10^{-8} cm/sec.
5	21 ft.	CL	.50	0	20	80	40	25	CLAY, silty and slightly sandy. Slight toughness. Slow dilatancy. Medium dry strength. Light tan. Estimated natural water content 20%. Estimated permeability 10^{-8} - 10^{-10} cm/sec.
6	10 ft.	CH	5.0	0	5	95	60	40	CLAY, silty with trace of fine gravel. High toughness. No dilatancy. High dry strength. Dark gray. Estimated natural water content 30%. Estimated permeability less than 10^{-10} cm/sec.
6	15½ ft.	SC	1½"	25	35	40	40	20	SAND, clayey and gravelly. The fine portion of the material has medium plasticity. Medium toughness. Slow dilatancy. Medium dry strength. Brown. Estimated natural water content 25%. Estimated permeability 10^{-8} - 10^{-10} cm/sec.
7	6½ ft.	CH-CL	0.1	0	10	90	50	35	CLAY, silty. Medium to high toughness. No dilatancy. Medium dry strength. Light brown to gray. Estimated natural water content 25%. Estimated permeability less than 10^{-11} cm/sec.
7	16 ft.	MH-ML	3/8"	5	45	60	50	30	SILT, clayey and sandy with trace of gravel. Medium toughness. Slow dilatancy. Medium dry strength. Dark Brown. Estimated natural water content 35%. Estimated permeability 10^{-6} - 10^{-8} cm/sec.

SOIL SAMPLE VISUAL CLASSIFICATION

Soil Mechanics & Foundation Engineers Inc.

IDENTIFICATION			ESTIMATED GRADATION				ESTIMATED ATTERBERG LIMITS		SOIL DESCRIPTION AND CLASSIFICATION
SAMPLE NUMBER	DEPTH	SOIL SYMBOL	MAXIMUM SIZE — MM	GRAVEL (plus #4)	SAND (#4 to #200)	SILT & CLAY (minus #200)	LIQUID LIMIT	PLASTICITY INDEX	1. Descriptive Classification 2. Particle Size, Shape, and Gradation (Uniformly, well, poorly graded) 3. Consistency, Elasticity, Toughness at Plastic Limit, etc. 4. Reaction to Shaking Test, Dry Strength, etc 5. Color, wet state 6. Natural Structure, mineral content 7. Natural Moisture Content (Est. in percent)
8	11 ft.	CL	1.0	0	30	70	30	20	CLAY, silty and sandy. Medium toughness. Low dilatancy. Medium dry strength. Brown. Estimated natural water content 27%. Estimated permeability 10^{-8} - 10^{-10} cm/sec.
8	18½ ft.	SC	3/8"	25	50	25	40	20	SAND, gravelly and clayey. Fine portion of the material has medium toughness and medium dry strength. Dark brown. Estimated natural water content 20%. Estimated permeability 10^{-5} - 10^{-6} cm/sec.
9	10 ft.	CL	.1	0	5	95	50	30	CLAY, silty. Medium toughness. No dilatancy. Medium to high dry strength. Gray. Estimated natural water content 25%. Estimated permeability less than 10^{-11} cm/sec.
9	20 ft.	CL	.1	0	15	85	40	20	CLAY, silty and sandy. Medium toughness. Medium dry strength. Slow dilatancy. Brown. Estimated natural water content 25%. Estimated permeability 10^{-8} - 10^{-10} cm/sec.
10	9½ ft.	CL	.5	0	10	80	40	20	CLAY, silty and slightly sandy. Same as hole 9 at 20 feet, except less sand content and the estimated natural water content is 20%.
10	14½ ft.	CL-CH	.1	0	5	95	50	35	CLAY, silty. High to medium toughness. No dilatancy. High dry strength. Dark brown. Estimated natural water content 25 %. Estimated permeability less than 10^{-11} cm/sec.
11	7 ft.	CL-CH	.1	0	0	100	60	45	CLAY, silty. High to medium toughness. No dilatancy. High dry strength. Gray. Estimated natural water content 30%. Estimated permeability less than 10^{-12} cm/sec.
11	20 ft.	CL-CH	.1	0	0	100	60	45	CLAY, silty. Same as Hole 11 at 7 feet, except the estimated natural water content is about 35-40 %.

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12	6 ft.	CL	.1	0	5	95	45	30	CLAY, silty. Medium toughness. No dilatancy. Medium dry strength. Gray. Estimated natural water content 25%. Estimated permeability less than 10^{-11} cm/sec.
12	20 ft.	CL	1.0	0	35	65	45	30	CLAY, silty and sandy. Medium toughness. Slow dilatancy. Medium dry strength. Gray. Estimated natural water content 30%. Estimated permeability 10^{-7} to 10^{-9} cm/sec.
13	10 ft.	CL	.5	0	10	90	40	25	CLAY, silty. Medium toughness. Very slow dilatancy. Medium dry strength. Light brown. Estimated natural water content 23%. Estimated permeability 10^{-8} to 10^{-10} cm/sec.
13	16 ft.	SM	1.0	0	60	40			SAND, silty. Poorly graded. Non-plastic. Light brown. Estimated water content 20%-22%. Estimated permeability 10^{-4} - 10^{-5} cm/sec. Quick dilatancy. No dry strength.
13	20 ft.	SM	1.0	0	75	25			SAND, silty. poorly graded. Non-plastic. Light brown. Estimated natural water content 25-30%. Estimated permeability 10^{-4} - 10^{-5} cm/sec. Quick dilatancy. No dry strength.
14	4½ ft.	CL	.5	0	15	85	35	20	CLAY, silty. Medium toughness. Slow dilatancy. Medium dry strength Light brown. Estimated natural water content 16%. Estimated permeability 10^{-8} - 10^{-9} cm/sec.
14	15 ft.	CL	.5	0	15	85	35	20	CLAY, silty. Same as hole 14 at 4½ feet except the estimated natural water content is 20-22%.

SOIL SAMPLE VISUAL CLASSIFICATION

Soil Mechanics & Foundation Engineers Inc.

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14	19 ft.	ML	2.0	0	40	60	30	5	SILT, sandy and slightly clayey, Non-plastic or slightly plastic. No toughness. Quick dilatancy. Dry strength none to slight. Light brown to medium brown. Estimated natural water content 25%. Estimated permeability 10^{-5} - 10^{-6} cm/sec.